

WHAT IS CLAIMED IS:

1. Block copolymers based on conjugated dienes and polar monomers, wherein the block copolymers comprise the polymerized conjugated dienes in amounts of 5 to 95 wt.% and the polymerized polar monomers in amounts of 95 to 5 wt.%, the polymerized dienes having a cis-1,4 content of ≥ 60 wt.%.
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2. Block copolymers according to Claim 1, wherein said conjugated dienes are selected from the group consisting of 1,3-butadiene, 1,3-isoprene, 2,3-dimethylbutadiene, 2,4-hexadiene, 1,3-pentadiene and/or 2-methyl-1,3-pentadiene.
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3. Block copolymers according to Claim 1, wherein said polar monomers are selected from the group consisting of lactones, lactams, thiolactams, epoxides, cyclic sulfides and cyclic carbonates.
4. Block copolymers according to Claim 3, wherein said polar monomers are selected from the group consisting of ϵ -caprolactone, γ -valerolactone, δ -valerolactone, γ -butyrolactone and/or β -butyrolactone.
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5. A process for the preparation of block copolymers based on conjugated dienes and polar monomers, wherein the block copolymers comprise the polymerized conjugated dienes in amounts of 5 to 95 wt.% and the polymerized polar monomers in amounts of 95 to 5 wt.%, the polymerized dienes having a cis-1,4 content of ≥ 60 wt.%.
20 comprising the steps of
 - (i) polymerizing the conjugated dienes in the presence of catalysts comprising
 - 25 (A) at least one compound of the rare earth metals,
 - (B) at least one organoaluminum compound and
 - (C) at least one Lewis acidand in the presence of inert organic solvents up to a conversion of ≥ 50 wt.%;
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 - (ii) adding the polar monomers to the polymerization mixture and polymerization is carried out up to a conversion of ≥ 30 wt.% and

(iii) isolating the resulting block copolymer, and

(iv) employing the conjugated dienes in the reaction mixture in amounts of 5 to 30 wt.% and the polar monomers in amounts of 1 to 30 wt.%.

5 6. The process according to Claim 5, wherein said conjugated dienes are selected from the group consisting of 1,3-butadiene, 1,3-isoprene, 2,3-dimethylbutadiene, 2,4-hexadiene, 1,3-pentadiene and 2-methyl-1,3-pentadiene.

 7. The process according to Claim 5, wherein said polar
10 monomers are selected from the group consisting of lactones, lactams, thiolactams, epoxides, cyclic sulfides and cyclic carbonates.

 8. The process according to Claim 7, wherein polar monomers are selected from the group consisting of ϵ -caprolactone, γ -valerolactone, δ -valerolactone, γ -butyrolactone and/or β -butyrolactone.

15 9. The process according to Claim 5, wherein the compounds of the rare earth metals which are employed are their alcoholates, phosphonates, phosphinates, phosphates and carboxylates and the complex compounds of the rare earth metals with diketones, the addition
20 compounds of the halides of the rare earth metals with an oxygen or nitrogen donor compound and allyl compounds of the rare earth metals.

 10. The process according to Claim 9, wherein said compounds of the rare earth metals are selected from the group consisting of neodymium versatate, neodymium octanoate and neodymium naphthenate.

25 11. The process according to Claim 5, wherein said organoaluminum compound is selected from the group consisting of aluminumtrialkyl, dialkylaluminum hydride and alumoxanes.

 12. The process according to Claim 5, wherein said Lewis acid is organometallic halides of group IIIA and IVA and/or halides of elements of
30 group IIIA, IVA and VA of the periodic table.

13. The process according to Claim 5, wherein said inert solvents are aliphatic or aromatic solvents.

14. The process according to Claim 13, wherein said aliphatic solvents are selected from the group consisting of butane, pentane,
5 hexane or heptane or said aromatic solvents are selected from the group consisting of benzene, toluene, ethylbenzene or dimethylbenzene or mixtures.

15. Vulcanizates with a filler content for the production of tires and tire components comprising block copolymers based on conjugated
10 dienes and polar monomers, wherein the block copolymers comprise the polymerized conjugated dienes in amounts of 5 to 95 wt.% and the polymerized polar monomers in amounts of 95 to 5 wt.%, the polymerized dienes having a cis-1,4 content of ≥ 60 wt.%.

16. A thermoplastic elastomer containing block copolymers
15 based on conjugated dienes and polar monomers which comprise the polymerized conjugated dienes in amounts of 5 to 95 wt.% and the polymerized polar monomers in amounts of 95 to 5 wt.%, the polymerized dienes having a cis-1,4 content of ≥ 60 wt.%.

17. A blend material for the modification of thermoplastics
20 comprising block copolymers based on conjugated dienes and polar monomers which comprise the polymerized conjugated dienes in amounts of 5 to 95 wt.% and the polymerized polar monomers in amounts of 95 to 5 wt.%, the polymerized dienes having a cis-1,4 content of ≥ 60 wt.%.